

Docket No. 448-001



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Kirchner et al )  
Serial No.: 10/779,829 ) Art Unit 2858  
Filed: February 17, 2004 )  
For: OPERATOR SENSING CIRCUIT FOR DISABLING )  
MOTOR OF POWER EQUIPMENT )

**INFORMATION DISCLOSURE STATEMENT**

Applicant hereby submits the following concise explanation of the relevance of each patent cited in its information disclosure statement.

U.S. Patent 3,703,217 ('217 patent) discloses an electrical system for a manually-operated steering system comprising a steering wheel including a capacitive sensing electrode that produces a first value of charge in the presence of the operator's hand, and a second value in its absence. A bridge circuit acts as a charge transfer processing sensor that provides an electrical charge to the sensing electrode and generates a first output signal when sensing the first value of electrode charge in the presence of the operator's hand and a second output signal when sensing the second value of electrode charge. The respective first and second sensor output signals are electrically coupled to allow the motor of the vehicle to continue operating, or to shut the vehicle down when they differ.

More specifically, in Figure 2 of '217 patent and its explanation in '217 column 3, oscillator circuit 12 provides an electrical charge to sensing electrode 6,7. Transformer 14 senses the quantity of charge on the sensing electrodes and generates a first output signal when a first value of sensed charge on the sensing electrode is sensed in the presence of the operator's hand, and a second output when a second value of sensed charge on the sensing electrode is sensed in the absence of the

operator's hand. Oscillator 12 gives power to transformer 14 that outputs a signal dependant on the value that changes with respect to electrode 6,7. The '217 bridge circuit sensor senses the quantity of charge on the sensing electrode that changes its value based upon the presence or absence of the operator's hand on steering wheel 2. An output signal is generated at the outputs of transformer 14 and switch circuit 15, which then controls the electrical coupling between the bridge circuit sensor and relay 17 that will either shut down the vehicle or allow the operating system of the vehicle to continue.

U.S. Patent 4,145,864 ('864 patent) discloses a battery driven lawnmower with an operator sensor attached to handle 14. The circuitry controls the operation of an electric lawnmower comprising an operator sensor responsive to the bridging of first and second operator contacts mounted on the lawnmower handle to provide a motor actuate signal and a power control circuit responsive to the motor actuate signal to connect the blade motor to a power source.

U.S. Patent 6,501,281 discloses a self-calibrating charge-transfer processing sensor that periodically sends an electrical charge to a capacitive sensing electrode that produces a first value of charge in the presence of the operator's hand, and a second value in its absence. The charge-transfer sensor then senses and processes the first and second electrode charge values to produce respective output signals to allow the vehicle motor to continue operating, or to shut the vehicle down by switching off the power unit on sensing second value different from the first value. This type grip system acts as a capacitor. Additional capacitors include a very small wheel-to-ground capacitance; a capacitance that produces defective information when a person touches an unshielded cable; a man-to-handle capacitance system; and a man-to-ground capacitance system.

Without a man touching the gripping surface (the “hands-off” status), the known system has a certain electrical capacitance. Upon starting the power equipment engine, the sensor calibrates itself and sets the measured capacity as a “hands-off” status at the sensing electrode affixed to the gripping surface. It is possible that starting the equipment motor requires a first person to start the motor while another holds the gripping surface. Then when the engine is started with the operator’s hands actually on the gripping surface, the disclosed self-calibrating sensor defines that “hands-on” status as a “hands-off” status. The prior art sensor thus registers only one-way changes of capacitance. A physical change from a “hands-on” gripping surface status to a “hands-off” status reduces the overall capacitance of the system. So if the sensor calibrates itself with a faulty “hands-on” status as described, the “hands-off” status will not be detected until the next calibrating process that occurs after the next change of system capacitance.

Described in terms of bit information values – digits, the sensor periodically sends bits of information to the electrode and receives digit values from the electrode that the sensor processes upon engine startup as indicating a “hands-on” level of digits. This establishes a standard “hands-on” first value number of digits each time the power equipment is started. Each subsequent time the sensor transfers a bit information charge to the electrode, the sensor receives and internally compares a return digit value to produce a sensor-processed output signal that will stop the power equipment engine if the second digit value is different from the first value.

This faulty “hands-on” startup self-calibration of an internally processing sensor leads to another problem. Often water and dirt are found on the gripping surface and/or the operator may use gloves that may produce faulty operation of the sensing circuit upon starting or during operation of

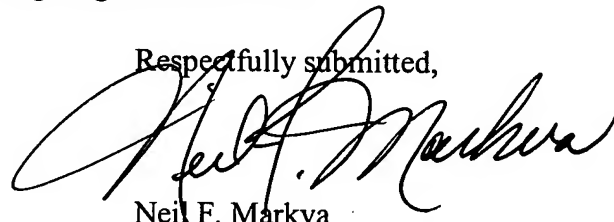
the equipment. For this prior art system does not distinguish between a "hands-on" and a "hands-off" condition in the presence of water and dirt or mud. And such conditions may stop the motor while an operator's hand is still grasping the gripping surface.

U.S. Patent 6,501,281 sensing electrode has a wire coil or metal net form wrapped around the handle within the gripping surface that is more sensitive at its edges to the presence of water, dirt, and/or muddy mixture. Longer lateral edges of the wire in the coil or net increases the capacitance of the prior art system so that it does not distinguish between "hands-on" the gripping surface and the presence of the water, dirt, and/or muddy mixture.

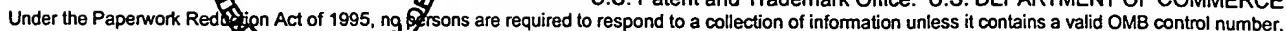
European Patent 0701917 is directed to a dead-man capacitive sense electrode disposed on a hand-grip for determining when the hand-grip is manually grasped. An electronic evaluation stage evaluates the signal received from the hand-grip and then controls a safety circuit that turns the engine off in the absence of an operator's hand. The electrode on the hand-grip of the European Patent is charged and senses a change in the value of the capacitance of the electrode. First and second output values are sent to a switching circuit for controlling the operation of the vehicle to which the system is affixed upon sensing a change in capacitance at the handgrip electrode.

Applicants' German patent DE 4,344,187, according to its abstract, is similar to the use of the oscillator circuit in the '217 patent with the oscillator supplying the electrical signal with the variation in the oscillator frequency altering the state of the signal generation circuit.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Neil F. Markva", is written over the typed name and title.

Neil F. Markva  
Attorney for Applicant



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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet

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of

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**Complete if Known**

Application Number	10/779,829
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<b>Filing Date</b>	2/17/2004
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First Named Inventor	Marcus Kirchner, et al
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Art Unit	2858
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Examiner Name \_\_\_\_\_

Attorney Docket Name	448-001
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## U.S. PATENT DOCUMENTS

## FOREIGN PATENT DOCUMENTS

Examiner  
Signature

Date  
Considered

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